Promoting Food Self-Sufficiency in the Mid-hills of Nepal: Fertilisers or Farmyard Manure?

SDC - Helvetas

Baitadi, Nepal. Photo: Helvetas.

This article concerns the work of the SDC-funded Sustainable Soil Management Programme (SSMP, implemented by Helvetas-Intercooperation). The programme focuses on improving soil fertility for promotion of food security and a better livelihood in the mid-hills of Nepal.

Capsicum harvest. Photo: Helvetas.

Situation Assessment

Environmental issues

The households of the mid-hills of Nepal are traditionally poor. With increasing population over the past decades, the problems of productivity decline in the bari (dryland, unirrigated) areas have accelerated. The major causes for this are:

- population pressure, decreasing land holdings, and environmental degradation;
- soil erosion, nutrient mining and a limited understanding of sustainable soil management (SSM) practices;
- a limited number of SSM practices validated under farm conditions;
- a limited knowledge, and networking, of appropriate and existing SSM practices amongst development institutions;
- a decreasing on-farm workforce due to significant male out-migration, thus increasing the workload on women, the very young and the elderly;
- insufficient awareness of gender issues related to sustainable soil management (SSM).

The consequences of the productivity decline, if unabated, will lead to further degradation of the production capacity on bari soils, increased nutritional deficiencies and poverty, and accelerated migration toward urban centres.

Poverty and economic issues

Nepal is one of the poorest countries in the world. Some 31 percent of Nepalese live below the national poverty line and nearly 70 percent below US$ 2 per day (UNDP Human Development Report 2007-2008) with these people being very largely concentrated in the rural areas. The problem of rural poverty remains widespread and most indicators suggest that it is on the increase. Some 80 percent of the working population live in rural areas and depend on subsistence farming.

The causes of poverty in the mid-hills of Nepal are many, but include:

- land ownership in the hands of a few,
- small land holdings - some 70 percent of households have less than one hectare, and many plots are too small to meet subsistence requirements,
- low productivity levels,
- a growing population, and
- illiteracy: the national adult literacy rate in 2005 was 49 percent (UNDP Human Development Report), less in the rural areas and significantly less for women and other disadvantaged groups.

Caste and gender discrimination issues

The most vulnerable groups are the lowest social castes, indigenous people and women. Social discrimination plays an important role in keeping the most disadvantaged people in rural Nepal poor and marginalised. Discrimination on the grounds of caste is officially illegal in Nepal but it remains widespread especially in the rural areas.

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increasing marginalisation. The conflict caused widespread disruption to development programmes, and to agriculture in particular. Many working household members left their homes, the infrastructure and social cohesion in many rural areas were wrecked, and agricultural production severely declined.

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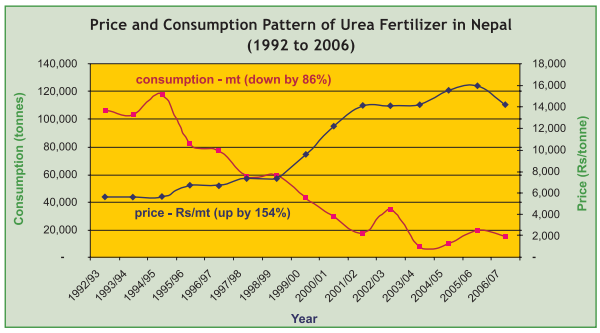
There are both positives and negatives in the current situation - the traditional social order, based on discrimination and feudal power structures, has been partially broken by 12 years of insurgency, but this has simultaneously led to instability in social, political and economic activity.

The Maoist rebellion begun in 1996 has recently ended with the appointment of the Maoist leader as Prime Minister. Hopes are high that political and social unity will prevail, and Nepal can now follow a peaceful development path focused on poverty alleviation and development in the rural areas.

Fertiliser use in the mid-hills

Data on fertiliser sales and consumption from the website of the Ministry of Agriculture and Cooperatives (Government of Nepal) records two very important facts:

- sales of urea have fallen 86 percent in the past 15 years;
- the price of urea has increased 306 percent in the past 22 years.



Similarly, sales of phosphorus fertiliser (DAP) have decreased in the last 14 years by 82 percent, and of an N:P fertiliser ("complex") by 69 percent. Like urea, prices of DAP have also soared, over 300 percent in the past 18 years.

SSMP works in 10 of the 78 districts of Nepal - in only one of these 10 districts is fertiliser use recorded in the MoAC data. This data must be viewed in general terms, as information from the SSMP cluster offices record many fertiliser outlets, and quite general use of fertiliser, especially by market-orientated farming households near the roads and main motorable tracks.

What is clear, however, are the trends - rapidly increasing prices and falling consumption. With the recent hike in energy prices affecting all manufacturing and transportation costs, and mid-2008 inflation rates of over 12 percent in South Asia, prices will continue to rise far beyond what is affordable by the vast majority of mid-hill farmers in Nepal.

Nepal has additional problems which may have affected the distribution, sales and use of fertiliser in the past decade - the civil war and associated unrest affecting many supply chains and accessibility, the deteriorating infrastructure especially in rural Nepal and the current poor availability and supply conditions of fuel.

Other observations on fertiliser use in Nepal include the following:

- the availability of different types of fertiliser in the local market places is poor;
- the quality of fertiliser has in the past been extremely variable; urea should have a 45 to 46 percent nitrogen content – some samples of locally available urea have been recorded as having five percent N content, zero percent K has recently been measured in samples of Muriate of Potash, and mixed fertiliser ratios are particularly variable;
- most mid-hill farmers know very little about either fertilisers or the nutrient status of their soil and often purchase whatever is available locally whether it is needed or not - besides the obvious fact that this is a waste of money, this may often be damaging to both soil and plants;
- adding to this lack of knowledge amongst the farming communities, the traders of fertiliser in Nepal are not experts in fertiliser types or modes of usage and are thus not able to provide advice - what they are interested in, however, is selling more fertiliser. In addition, the poor coverage of the government extension services in Nepal leaves a vacuum in the provision of assistance to the farmers;
- techniques of fertiliser application also leave much to be desired - broadcasting urea without incorporation into the soil is common;
- the use of urea, by far the most commonly used fertiliser in Nepal, is commonly reported to be detrimental to soil structure and workability. In addition, it promotes further acidity in already acid soil conditions within the mid-hills.

The Sustainable Soil Management Project (SSMP)

The SDC-funded SSMP, implemented by a Helvetas-Intercooperation consortium, commenced in 1999 and the 3rd phase of the programme began in January 2008.

Fertilliser for the plants. Photo: Helvetas.

Planting seedlings. Photo: Helvetas.

What does SSMP do?

With the aim of improving livelihoods, SSMP promotes proven and appropriate soil management technologies to the farming households of the mid-hills of Nepal through a pluralistic approach in agricultural extension.

What does SSMP offer to the farmers?

The main promoted technologies, all of which must be economic, and socially and environmentally friendly, are listed below.

- Improvement in the quality of farm yard manure (fym) in a five step programme:
  - maintenance of a well managed heap or pit properly protected from the sun using a protective cover, usually plastic or bamboo-foliage roof;
  - protection from the rain, run-in and run-on water;
  - proper drainage, collection, and storage of cattle urine through simple redesign of the cattle shed;
  - regular turning of the fym, and maintenance of the material in a moist condition before carrying it to the field;
  - no exposure to the sun of the small fym heaps in the field prior to application - again covering is crucial.
- The use of the cattle urine as a fertiliser, plant tonic and bio-pesticide.
- The combining of the above practices with inclusion of legumes, fodder and forage plants into the rotation.
- The incorporation of vegetables and other cash crops into the cropping systems.

Adoption rates of up to 60 percent are recorded for farmers now using the basic fym improvement technologies (a above). Nearly all farmers interviewed at different times during the past five years are convinced that these practices result in higher yields, better quality produce, improved soil conditions (workability), in lower expenditures on chemical fertiliser, and in higher household incomes.

How does SSMP operate?

SSMP works through local NGOs and CBOs who compete for programme funds via a competitive grant system (CGS); proposals from these local organisations are evaluated by an independent technical committee, and contracts awarded on the basis of technical quality, gender and caste inclusion, and poverty and geographical remoteness of the target communities. SSMP has established a system of lead farmers and experienced lead farmers to support the farmer-to-farmer approach (FtF), a key vehicle for further dissemination, and a crucial element of a decentralised extension system, responsive to the farmers needs and in reaching isolated communities who have no access to the government extension structures.

SSMP is committed in all its endeavors to an inclusive work ethic, a focus on the poor and discriminated, and strives for equal access of men and women in its activities.

SSMP in the current mid-hills situation

As reported earlier, fertiliser prices have soared in the past two decades, high oil prices are seriously affecting the cost of transportation and life in Nepal has been severely impacted by unrest, lack of fuel, high inflation and damaged infrastructure. These factors provide further economic and environmental justification for the promotion of SSM practices:

- the raw materials for fym and compost are available locally free of charge - there are no transportation or purchase costs;
- nitrogen is available free of cost in the urine of farm animals;
- urine can be used as an additional input to the fym and compost, as a plant nutrient tonic, and as a plant bio-pesticide, further reducing the need for expensive agro-chemical inputs;
- SSM practices improve the quality of compost and fym that is applied to the farm and thus makes best use of the available resources.

SSMP and the SSM practices that are promoted are thus increasingly relevant and important in the struggle for mid-hill food availability and livelihood sustainability.

The impacts of SSMP

Eight impact studies were undertaken in 2007 after eight years of SSMP implementation. A brief summary of the highlights is presented below.

- SSM technologies developed and extended to over 25,000 hill farmers per annum during Phase 2 have increased the soil nutrient reserve, have had a positive influence on agricultural productivity and have enhanced household incomes;
- the three technologies which have been most adopted in the past three years are improved farmyard manure preparation and management, legume integration in the cropping cycle, and organic pest management;
- the competitive grant system (CGS) and farmer to farmer diffusion (FtF) are cost effective extension mechanisms;
- operating the FtF system through lead farmers and experienced leader farmers leads to demand-led agricultural development in the rural areas, and is far more effective in reaching remote areas which otherwise remain untouched by the government extension service;
- SSMP has had a significant impact on policy development in relation to greater use of locally available natural

resources and improved fym production. The Agricultural Perspective Plan, reviewed in 2006, and the revised National Fertiliser Policy have both taken note of SSMP's achievements, the CGS has been adopted by other government and non-government projects and institutions, and the FtF extension system has been fully endorsed in the 10th Five Year Plan and the national extension strategy.

At the on-farm level, there is a notable beneficial impact of SSM practices on soil fertility. Over 2000 soil analysis benchmark sites have been established over the past eight years. Not all these benchmark sites are now, over time, comparable, but an interim review of soil and fym analysis results from the most reliable sites (n = between 35 and 132) record the following strong trends:

- improved fym production, storage and application practices, including additions of cattle urine, resulted in a significant improvement in the nitrogen content in the prepared fym: a potential increase of 10percent per annum in the N content of the fym can be expected;
- over a 2 to 3 year period, improved practices also increase soil organic matter by between 10 and 15 percent, and soil nitrogen content by around 10 percent;
- SSM practices also result in an increased soil P level, and a potential increase in the on-farm soil P content, somewhere in the region of 10 percent per annum, can be expected in the first few years.

In a separate study, the impact of SSM practices at the global scale has been illustrated in terms of carbon capture in the soil.

In four locations that had completed six years of SSMP operation, soil organic carbon density (quantity of carbon per unit area) increased from 36 ton/ha in year 0 to between 65 and 83 ton/ha in the 6th year. Annual accumulation of soil organic carbon was estimated to be 4.8 and 7.8 t/ha/annum for the low and the high scenario. If it were possible to value soil carbon on the world market, even at conservative rates, this 6 year storage of carbon would be worth between US $ 4 to 7 million. Or put another way, each mid-hill farming household in Nepal, adopting sustainable soil management practices, could trade soil carbon worth around US$10 per year - if given access to the carbon trade market.

Where SSMP operates best, the programme also empowers civil society actors, especially women and disadvantaged groups, and transparently provides sound technical solutions that impact on soil fertility and livelihoods, thereby assisting to alleviate long-term food shortages and poverty.

Future Challenges for SSMP

As it is felt that sufficient local capacity does not yet exist to expand the technologies and practices to wider areas, future challenges include:

- institutionalising key technical and process aspects of the programme into both government and non-government sectors,
- inclusion of key technical and approach elements of the programme into the curricula of educational institutes at different levels;
- outscaling of the key lessons through both the private and public sector to a much wider audience in Nepal and other mountain communities in the developing world,
- entrenching the FtF and CGS system at local level in the districts;
- as more and more males are leaving their home villages, and even the country, to find paid employment, women are increasingly taking the lead role on the farm, and some of the technologies developed and extended may not take this fact sufficiently into account. What must be avoided is increasing the already heavy workload of women.

Success Stories

"Shyam Maya, hard work and dedication, and now a leader farmer"

Shyam Maya and her father. Photo: Helvetas.

"I had to stop my schooling when I lost my mum 15 years ago. Then my father lost his vision from motiyabindu (night blindness) in BS 2058 (2001). After that I had to bear all the responsibility of caring for my father and the farm. We have 11 ropani of land and we only used to produce enough millet and maize for three months", says Ms. Shyam Maya Rai, Baruneshor-8, Okhaldunga.

Since 2058 BS, she has been a member of a group formed by the Local Development Fund and her group received support from the District Road Support Programme (DRSP). For five years with her group members, she found work on the Rampur-Okhaldhunga road for 30-45 days per year. In her own words: "I got the opportunity to participate in training on various SSM practices, after SSMP started to work with our group since 2062 BS. I was also selected as a leader farmer of my group, which inspired me to start vegetable production. I then received support for a plastic tunnel where I produced off-season tomato and earned NRs 13,000 in one season. In three years, I have now earned NRs 35,000 from tomato production and will continue. I am also producing other vegetables like cabbage, cauliflower, radish, cucumber, okra, beans, and peas, and sell these at the weekly haat baazar in Okhaldhunga. Vegetables grown from one ropani has now become the major income source for our family".

She then improved her cattle shed so that she could collect urine and upgrade the quality of the fym she prepares; she also prepares gitimal (bio-pesticides) and uses it on her vegetables. Now she is the manager of Kamladip Misrit Samudaik Sanstha, a women's cooperative and has received training as an IPM facilitator. Subsequently, she facilitated an IPM farmer field school supported by APPSP (DFiD), and a polyhouse vegetable production training, supported by the DADO at Bigutar.

She concludes: "In the beginning, my father, who is 85 now, was not happy with me being away from home attending group meetings and trainings, but nowadays he is convinced by my work and proud of me. My neighbors are also getting courage and ideas from my work". And her future plans? "I was selected as an Experienced Leader Farmer (ELF) and very recently received 4 days capacity building training. These have greatly encouraged my interest in providing support to other farmers in remote villages and in sharing my agricultural experiences through the farmer to farmer (FtF) extension programme. I am so interested in starting this new challenge".

"SSM and vegetable production helped me pay back a big loan and send the kids to school"

Sanu Sharma with her daughters. Photo: Helvetas.

"Five years ago, I was nearly ruined when my husband died leaving a Rs 300,000 debt, and three small children to care for" says Sanu Sharma, 39, from Piple-3 of Myagdi. She got a job earning NRs 1,500 a month but this ended after two years - then, cultivating a small piece of land (1.5 Ropani) became the only alternative..

This piece of land became the basis for feeding the family and also to fulfill all other living requirements, including her children's education and to pay back the loan. These were great challenges for her. She searched for assistance with her small piece of land and found the Hilly Resource Development Centre (HRDC) one of SSMP's partners, and Sanu and her daughters bravely started to grow vegetables with SSM practices.

"I have already sold potato, cabbage, cauliflower and fermented cabbage (gundruk) and earned NRs 16,000, and still have some vegetables to sell this season". She describes how she linked SSM with vegetable production: "After I got training, I started to improve the way I prepared and managed the fym, to practice organic pest management and grow vegetables. I produced improved fym, protecting it from direct sunlight and avoiding run-on, and making best use of cattle urine. The improved fym is light and easy to apply, takes less labour to carry it to the field, and it increases my crop production. I now realise we were losing thousands of rupees especially through the loss of urine. I use the urine on my vegetables not only for nutrients but also it works as a pesticide against vegetable pests. I also use it to make gitimal (organic pesticides), mixing plant parts, including buds and leaves, from banamara, asuro, titepati, timur, sisno, khirro, ketuki, simali with cattle urine and then leaving to ferment for 25-35 days. I feel these fym, cattle urine and gitimal are like a melodious song for plants where they feel they are in a relaxing environment and grow well. I am also growing beans once a year which is also improving my land through nitrogen fixing, I believe".

Sanu Sharma concludes by saying that after three years of effort on vegetable production with SSM practices and saving with Dhukuti (a saving credit scheme), she has finally paid off her inherited loan, and all her children are doing well in school.

"Now I have realised the value of cattle urine", says Kamala

Healthy rice seedlings due to the use of cattle urine 10 days before seed sowing. Photo: Helvetas.

"See my rice seedlings on this two anna (62 m^2).... it is taller, healthier and has grown faster and this is due to cattle urine. I applied 42 litres of fresh urine to this land 10 days before seed sowing." says Kamala Kharal from Dagatumdanda-7, in Kharbang, Baglung District.

She added: "In previous years when I was not using cattle urine, the rice seedlings used to be shorter, pale yellow with dried tips and margins, and were often attacked by several insect pests".

After she became involved in the CYC group, a local SSMP partner, she learnt about SSM practices, and she improved her cattle shed so that she could regularly collect cattle urine. She uses the collected cattle urine as fertiliser and for bio-pesticide (gitimal) to protect her vegetable crops. Kamala has now adopted other SSM practices, including fym improvement, and the integration of legumes in her fields.

She concludes: "After I started to adopt SSM practices on my cereals and vegetables, the yields increased considerably. Before my three ropani of land was not enough to produce food for six months; now.....this land feeds us for the whole year. I have sold vegetables and earned NRs 16,000 in a season from one ropani. Local collectors now come to my home to collect my vegetables, saying Kamala produces organic vegetables!"

Dev Singh Thagunna - now back home and doing well.

Four years ago, Mr. Dev Singh Thagunna, aged 27, was searching for work in various Indian cities and earning about NRs 10,000 per year, far from sufficient to care for his five person family. Back home in Baitadi (Basantapur VDC, Ward No.4), his spouse and children were living in miserable conditions, and the five ropani which they own remained under-utilised due to his absence. The family only grew cereals and the produce was not enough to feed the family.

In 2062 BS (2005), Mr. Thagunna participated in one of the trainings provided by SADA, one of SSMP's partners working in Baitadi District. He says "I had no idea how to grow vegetables or spice crops before. However, after the training, I was inspired to carry out some experiments on small plots on my farm, and SADA really helped me. After a year's experience growing vegetables and spice crops, I was convinced that I could improve my family's condition considerably from these crops".

What did he do then? He continued: "With SSM practices, I started to produce cabbage, cauliflower, tomato, rayo, radish, onion, legumes like French beans, and spices like chilli, garlic and ginger on my five ropani of land. I am now earning NRs 50,000 per year, and of this I am saving NRs 20,000 every year".

He added that, at the beginning, his father and other brothers were not happy with his practice of growing vegetables and spices instead of growing cereals on the land he had inherited. However, they also now realise that it is more profitable to grow these crops than the traditional crops. These days Mr. Thagunna is recognised as a leading farmer in the district and is attracting neighbours towards vegetable and spice crop production.

He concludes: "Now I don't have to leave my family and go abroad any more searching for work. I can earn more and live a better life from my land - here at home with my family".

"An impossible dream just a few years ago."

Chandra Kumari, preparing land for polyhouse tomato planting. Photo: Helvetas.

"Days were very difficult and challenging for me. I only had 1 ropani of land where I used to grow cereal crops - this was all we had to feed and support our family of five. We were so poor", says Chandra Kumari Bishwakarma of Marvu VDC in Dolakha District. "Before 2006, we got no support from the outside and I had no idea of improved agricultural practices".

Since 2006, ECARDS-Dolakha, another of SSMP's local partners begun introducing SSM practices in Chandra Kumari's area; she became actively involved in the programme, receiving training and technical support for vegetable production.

She began collecting urine from her two buffaloes, took serious steps to improve the way she prepared, managed and applied the fym, and started to grow vegetables like cauliflower, potato, onion and tomato.

"Now I grow enough good quality vegetables to sell at the Singati bazaar, and on average I am earning NRs 10,000 per year. My vegetable production is increasing due to improved fym and urine application as a plant tonic - I collect about seven litres a day in a drum. With my increased income, I have purchased two more buffalo and another half ropani of land. Now I am also managing my childrens' education expenses - an impossible dream just a few years ago."

Chandra Kumari has now become a lead farmer in her group and helps to further extend the use of SSM practices in her area.

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Food Security in Mountains – High Time for Action

11 December
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The problem of hunger in mountains is getting worse. Harsh climates and the difficult, often inaccessible terrain combined with political and social marginality make mountain people vulnerable to food shortages. Indigenous knowledge about local foods and traditional agricultural practices in mountain areas is eroding and agricultural diversity as well as productivity are declining, further increasing the vulnerability of mountain people.

Recent studies indicate that mountain populations suffer from high rates of micronutrient deficiencies, which is one of the contributing factors to the significantly higher infant mortality rates in mountain regions.

Northern Gorkha, Nepal. Photo: Ujol Sherchan.

Now food prices are soaring worldwide and increased transportation costs to remote mountain areas mean mountain communities are paying that much more for their food.

International Mountain Day 2008 (IMD2008), with its theme of Food Security in Mountains, was an apt occasion to reflect on how hard it is for mountain people to consistently get adequate and nutritious food to lead healthy and active lives. Priorities for improving food security in mountains include promoting and expanding traditional mountain crops; safeguarding indigenous land use practices; improving breeding programmes of mountain-adapted livestock; better market access; and mountain-specific public policy, developed with the participation of mountain people.

Source: IMD 2008 public service announcement, FAO.